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(71) Applicant: 000004226
NTT Corporation
3-1 Otemachi, 2-chome
Chiyoda-ku, Tokyo

(72) Inventor: Akira Shinoda
NTT Corporation
19-2 Nishi-Shinjuku 3-chome
Shinjuku-ku, Tokyo

(74) Agent: 100087848
Yoshimichi Ogasawara, patent attorney, and one other

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(54) [Title]   COMMUNICATION METHOD CONTROLLING BROADCAST COMMUNICATION GROUP AND RECORDING MEDIUM RECORDING PROGRAM DESCRIBING SAID COMMUNICATION METHOD

(57) Abstract

Problem

The objective of the present invention is to control the formation and deletion of groups and the execution of broadcast data communication to enable remote broadcast data communication with respect to multiple computers which are unmanned terminals.

Means to solve

To enable the transmission of data from one given computer in order to have broadcast communication performed at unmanned computers, [the method] can control any one of: an instruction to form a group; an instruction to leave a group; and an instruction to perform broadcast communication.
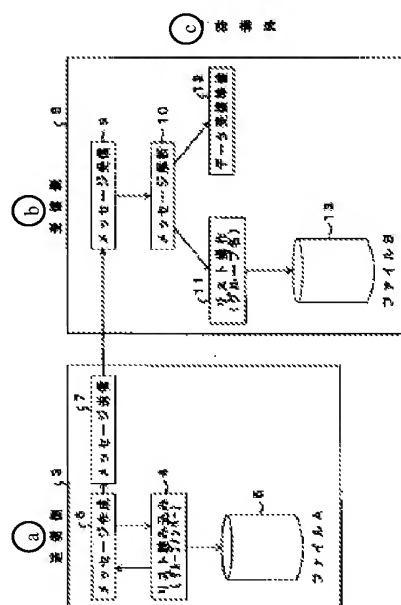
Key: a   Transmitting side

b	Receiving side
c	Function configuration
4	Reading of list (group members)
5	File A
6	Create message
7	Transmit message
9	Receive message
10	Analyze message
11	List operation (group name)
12	Preparation for data reception
13	File B

[There are no amendments to this patent.]

Claims

1. With respect to communication between computers connected to a network, wherein multiple computers can communicate with each other, a communication method that controls a broadcast communication group, characterized in that

when broadcast communication is performed, wherein data is transmitted from one given computer and the data is received simultaneously by multiple automatically operated computers other than the aforementioned computer,

in order for the receiving computers to perform an operation to join a group, a string of identifiers for the multiple receiving computers that form a group and a group name are transmitted as one message from the transmitting computer,

and among all the receiving computers that receive said message, when the identifier of a receiving computer corresponds to the string of identifiers, the aforementioned group name in said message is stored as the identifier when broadcast communication is performed,

and the receiving computer uses the relevant identifier during subsequent broadcast communication.

2. With respect to communication between computers connected to a network, wherein multiple computers can communicate with each other, a communication method that controls a broadcast communication group, characterized in that

when broadcast communication is performed, wherein data is transmitted from one given computer and the data is received simultaneously by multiple automatically operated computers other than the aforementioned computer,

in order for the receiving computers to perform an operation to leave a group, a string of identifiers for the multiple receiving computers that are to leave a group and a group name are transmitted as one message from the transmitting computer,

and among all the receiving computers that receive said message, when the identifier of a receiving computer corresponds to the string of identifiers, the aforementioned stored group name is deleted,

and the receiving computer uses the relevant identifier during subsequent broadcast communication.

3. With respect to communication between computers connected to a network, wherein multiple computers can communicate with each other, a communication method that controls a broadcast communication group, characterized in that

when broadcast communication is performed, wherein data is transmitted from one given computer and the data is received simultaneously by multiple automatically operated computers other than the aforementioned computer,

in order for the receiving computers to perform an operation to prepare for broadcast communication, a group name is transmitted as one message from the transmitting computer as the identifier of the group performing broadcast communication,

and among all the receiving computers that receive said message, the group name in said message and the group name stored in the receiving computer are compared, and when they are the same, broadcast communication is performed.

4. With respect to a recording medium for communication between computers connected to a network, wherein multiple computers can communicate with each other, a recording medium that records a program that describes a communication method controlling a broadcast communication group, characterized in that it describes and records, in the form of a program, a method whereby

when broadcast communication is performed, wherein data is transmitted from one given computer and the data is received simultaneously by multiple automatically operated computers other than the aforementioned computer,

in order for the receiving computers to perform an operation to join a group, a string of identifiers for the multiple receiving computers that form a group and a group name are transmitted as one message from the transmitting computer,

and among all the receiving computers that receive said message, when the identifier of a receiving computer corresponds to the string of identifiers, the aforementioned group name in said message is stored as the identifier when broadcast communication is performed,

and the receiving computer uses the relevant identifier during subsequent broadcast communication.

5. With respect to a recording medium for communication between computers connected to a network, wherein multiple computers can communicate with each other, a recording medium that records a program that describes a communication method controlling a broadcast

communication group, characterized in that it describes and records, in the form of a program, a method whereby

when broadcast communication is performed, wherein data is transmitted from one given computer and the data is received simultaneously by multiple automatically operated computers other than the aforementioned computer,

in order for the receiving computers to perform an operation to leave a group, a string of identifiers of the multiple receiving computers that are to leave a group and a group name are transmitted as one message from the transmitting computer,

and among all the receiving computers that receive said message, when the identifier of a receiving computer corresponds to the string of identifiers, the aforementioned stored group name is deleted,

and the receiving computer uses the relevant identifier during subsequent broadcast communication.

6. With respect to a recording medium for communication between computers connected to a network, wherein multiple computers can communicate with each other, a recording medium that records a program that describes a communication method controlling a broadcast communication group, characterized in that it describes and records, in the form of a program, a method whereby

when broadcast communication is performed, wherein data is transmitted from one given computer and the data is received simultaneously by multiple automatically operated computers other than the aforementioned computer,

in order for the receiving computers to perform an operation to prepare for broadcast communication, a group name is transmitted as one message from the transmitting computer as the identifier of the group performing broadcast communication,

and among all the receiving computers that receive said message, the group name in said message and the group name stored in the receiving computer are compared, and when they are the same, broadcast communication is performed.

Detailed explanation of the invention
[0001]
Industrial application field

The present invention pertains to broadcast communication between computers connected to a network, wherein multiple computers can communicate with each other. The invention also pertains to a communication method that controls a broadcast communication group, and to a recording medium that records a program describing said communication method.

[0002]

Prior art

For a computer network that supports IP (Internet Protocol) communication between multiple computers, broadcast communication—whereby data is transmitted from one computer to multiple other computers simultaneously—is possible with the IP multicast communication defined by RFC (Request for comments) 1112. With said broadcast communication, groups are formed and then communication is performed.

[0003]

Mbone is a worldwide experimental IP multicast network. With Mbone, a transmitter forms an arbitrary group, and recipients are added thereto. Because there are many transmitters, recipients select a desired group. In this case the recipient's operations are operations performed by persons using tools.

[0004]

With automated unmanned terminals, operations involving manual intervention cannot be performed.

[0005]

Problem to be solved by the invention

With broadcast communication such as IP multicast communication, broadcast data communication to multiple computers is possible, but manual operations are required for operating the receiving computers, and with computers that are unmanned terminals, operations to enable broadcast data communication cannot be performed.

[0006]

The present invention was devised in response to the aforementioned problem, the objective being to form and delete groups and to control the execution of broadcast data communication remotely—in particular, to perform transmitting-computer-driven broadcast data communication by performing the aforementioned control with respect to multiple receiving computers from a transmitting computer—for the purpose of enabling broadcast data communication with respect to multiple computers which are unmanned terminals.

[0007]

Means to solve the problem

To achieve the aforementioned objective, message data which provides operating instructions is transmitted from a transmitting computer to receiving computers, and the receiving computers are controlled by means of said data.

[0008]

There are three operations for a receiving computer that receives the aforementioned data: joining a group, leaving a group, and preparing for broadcast data communication.

[0009]

Figure 1 is an example of message data for the operations of a receiving computer. The operation code is a code in the message identifying the operation by the receiving computer. Identifier 1—Identifier n are identifiers which uniquely identify receiving computers. The group name is the name for a broadcast communication group.

[0010]

With the communication method of the present invention for controlling a broadcast communication group, the transmitting computer creates a message indicating a receiving computer operation, and this is transmitted from the transmitting computer to the receiving computers. After a receiving computer receives said data it performs the operation according to said data. Three operations—joining a group, leaving a group, and preparing for broadcast data communication—are required of a receiving computer; the transmitting computer is provided with a function whereby it creates message data for the respective operations, and a receiving computer is provided with functions corresponding to the aforementioned three operations.

[0011]

The means of a receiving computer with respect to the aforementioned three operations are as follows:

(1) After message data for joining a group is received, the identifier of the receiving computer and the multiple identifiers in the message data are compared, and if the relevant identifier exists in the string of identifiers in the message data, the group name is stored.

(2) After message data for leaving a group is received, the identifier of the receiving computer and the multiple identifiers in the message data are compared, and if the relevant identifier exists in the string of identifiers in the message data, the stored group name is deleted.

(3) After message data for preparing for broadcast data communication is received, if the group name stored in the receiving computer and the group name in the message data are identical, an operation to prepare to receive broadcast data communication is performed.

[0012]
Embodiment of the invention

In the following, an embodiment of the present invention will be explained with reference to the figures.

[0013]
Figure 2 is a network, wherein multiple computers can communicate with each other, and is a network capable of broadcast communication. In the figure, the code 1-i indicates a computer and 2 indicates a network. In addition, for example, TCP (UDP)/IP is used as the communication protocol, and IP multicast is used as the broadcast communication protocol. The assignment of the operating codes is shown in Figure 3 and details on the configuration of the message data are shown in Figure 4.

[0014]
In the message data shown in Figure 1, when the operation code is, for example '8', it indicates to 'join a group'. Figure 4 shows in more detail each of the identifiers shown in Figure 1.

[0015]
To enable the transmitting computer to confirm the completion of a process by the receiving computer, an acknowledgement is transmitted from the receiving computer. Therefore, an acknowledgement is added to the message data.

[0016]
The IP address that uniquely identifies the receiving computer is used as the identifier. In the preparation for broadcast data communication, in addition to the group name, the service port number and the group IP address data, which are information necessary for broadcast data communication by means of IP multicasting, are included. In addition, the number of included IP addresses is included in the messages for joining a group and leaving a group. Data other than the acknowledgement is terminated with a null character.

[0017]

Figure 5 shows the series of operations whereby the transmitting computer creates and transmits a message and the receiving computer receives said message and executes processes according to said message.

[0018]

In the figure, code 3 is the transmitting-side computer; 4 is a list reading unit; 5 is a file A; 6 is a message creation unit; 7 is a message transmission unit; 8 is a receiving-side computer; 9 is a message reception unit; 10 is a message analysis unit; 11 is a list operations unit; 12 is a data reception preparation unit; and 13 is a file B.

[0019]
Next, the operation will be explained.
(1) Message creation

Individual messages are created for broadcast data communication preparation, for joining a group, and for leaving a group. A broadcast data communication group is formed by one or more receiving computers. Therefore, a list of the IP addresses of the receiving computers corresponding to the group name is stored as a file. This file is called 'file A'.

* Joining a group

When receiving computers are supposed to join a group, a list of the IP addresses of the needed receiving computers is stored in file A. At message creation unit 6, this list is read from file A by means of reading unit 4, and a message to join the group is created.

* Leaving a group

When receiving computers that are part of a group are supposed to leave a group, a list of the IP addresses of the receiving computers to leave the group is stored in file A. At message creation unit 6, this list is read from file A by means of reading unit 4, and a message to leave the group is created.

* Preparing for broadcast communication

When receiving computers are supposed to prepare for broadcast data communication, the name of the group to be prepared, and the service port number and IP addresses corresponding thereto are used to create the message.

(2) Transmitting

Messages created during the aforementioned message creation are transmitted via a message transmission unit 7.

(3) Receiving

Messages transmitted by the aforementioned transmission unit are received by a message reception unit 9.

(4) Analyzing

Messages received with the aforementioned reception unit are analyzed in message analysis unit 10, and this unit differentiates between messages to join a group, leave a group, prepare for broadcast data communication, and other messages. For messages to join a group or to leave a group, list operations unit 11 is notified, and for messages to prepare for broadcast data communication, broadcast data communication preparation unit 12 is notified.

(5) List operations

Joining/leaving a group involves an operation of storing/deleting a group name. With the present embodiment, list operations unit 11 stores the group name in file B. Therefore, operations involving joining/leaving a group involve an operation by list operations unit 11 with respect to file B.

* Joining a group

If the address of the receiving computer is in the list IP address list of the received message, the group name in the message is stored in file B.

* Leaving a group

If the address of the receiving computer is in the list IP address list of the received message, the group name that matches the group name in the message is deleted from file B.

* Preparing for broadcast communication

If the group name in the received message matches a group name stored in file B, data reception preparation unit 12 begins preparation.

[0020]

As described above, the present invention uses messages and by creating functions corresponding to each message with a transmitting computer and receiving computers, group

control is enabled during broadcast communication, which is the objective of the present invention.

[0021]

In addition, the aforementioned communication method can be described in the form of a program and recorded on a recording medium. The present invention includes any relevant recording medium.

[0022]

Effect of the invention

As explained above, by means of the present invention, when broadcast communication on a network is performed from one given computer with respect to multiple automatically operated computers, messages are created with respect to functions for joining a group, leaving a group, and preparing for broadcast data communication in order to control a broadcast group, and said messages are transmitted as data from a transmitting computer to receiving computers; in this way, group control is enabled during broadcast communication with respect to multiple automatically operated computers.

Brief description of the figures

Figure 1 shows an example of message data.
Figure 2 shows an example of a network capable of broadcast communication.
Figure 3 shows an example of operation codes.
Figure 4 shows the configuration of message data in detail.
Figure 5 shows the function configuration.

Explanation of symbols

1   Receiving computer
2   Network
3   Transmitting-side computer
4   List reading unit
5   File A
6   Message creation unit
7   Message transmission unit
8   Receiving-side computer
9   Message reception unit
10   Message analysis unit

11 List operations unit

12 Data reception preparation unit
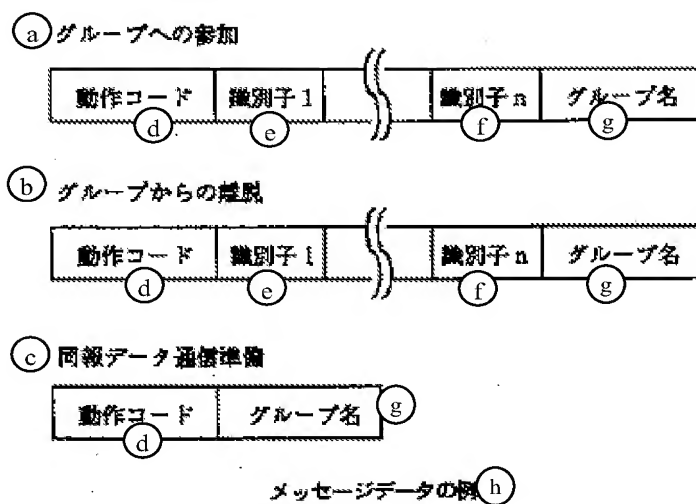
13 File B

Figure 1

Key: a Join the group

   b Leave the group

   c Prepare for broadcast data communication

   d Operation code

   e Identifier 1

   f Identifier n
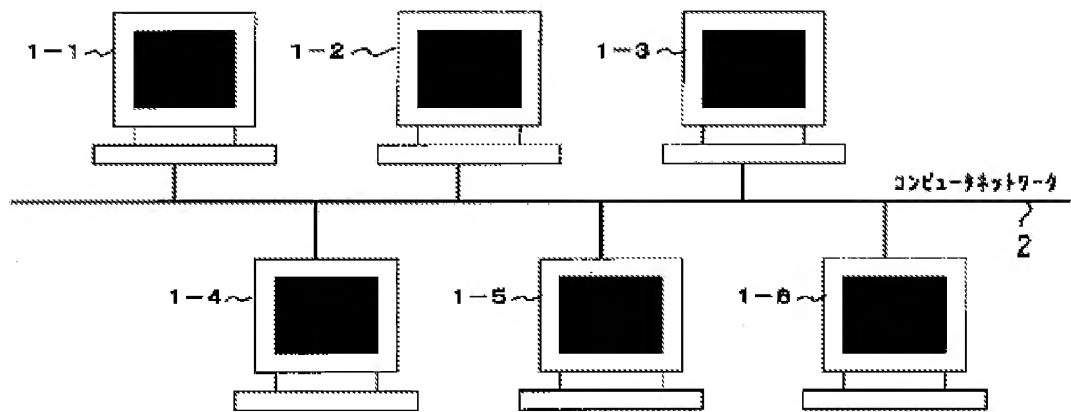
   g Group name

   h Example of message data

Figure 2

Key: 2   Computer network

Figure 3

Key: a   Operation code
        b   Operation
        c   Acknowledge
        d   Preparation for broadcast data communication
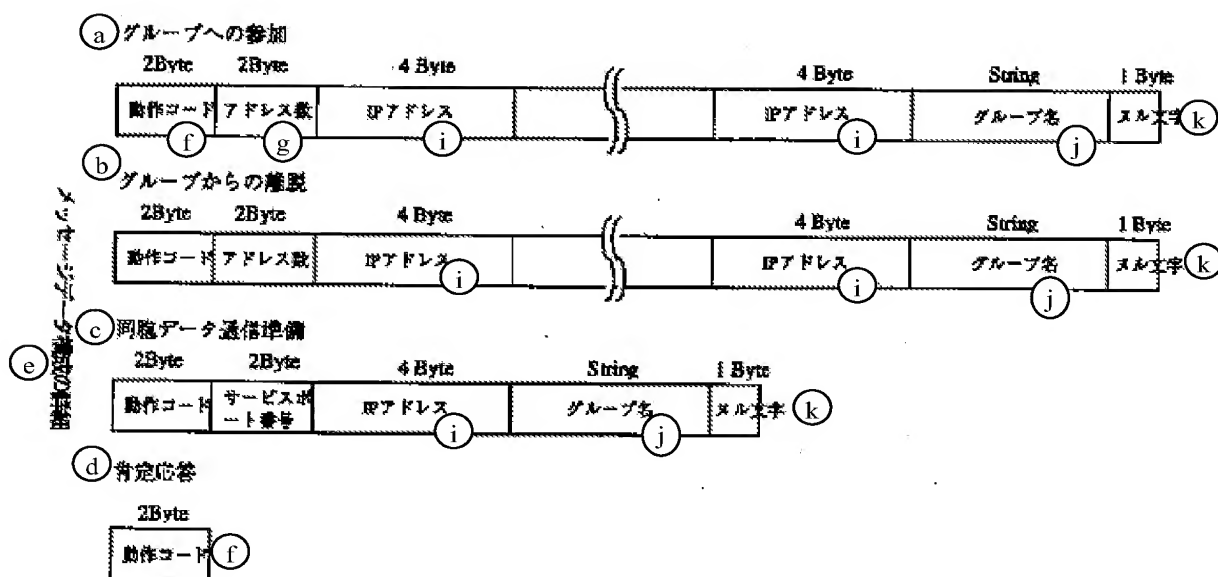   e   Join the group
        f   Leave the group

Figure 4

Key: a   Join the group
      b   Leave the group
      c   Prepare for broadcast data communication
      d   Acknowledge
      e   Details of message data configuration
      f   Operation code
      g   Number of addresses
      h   Service port number
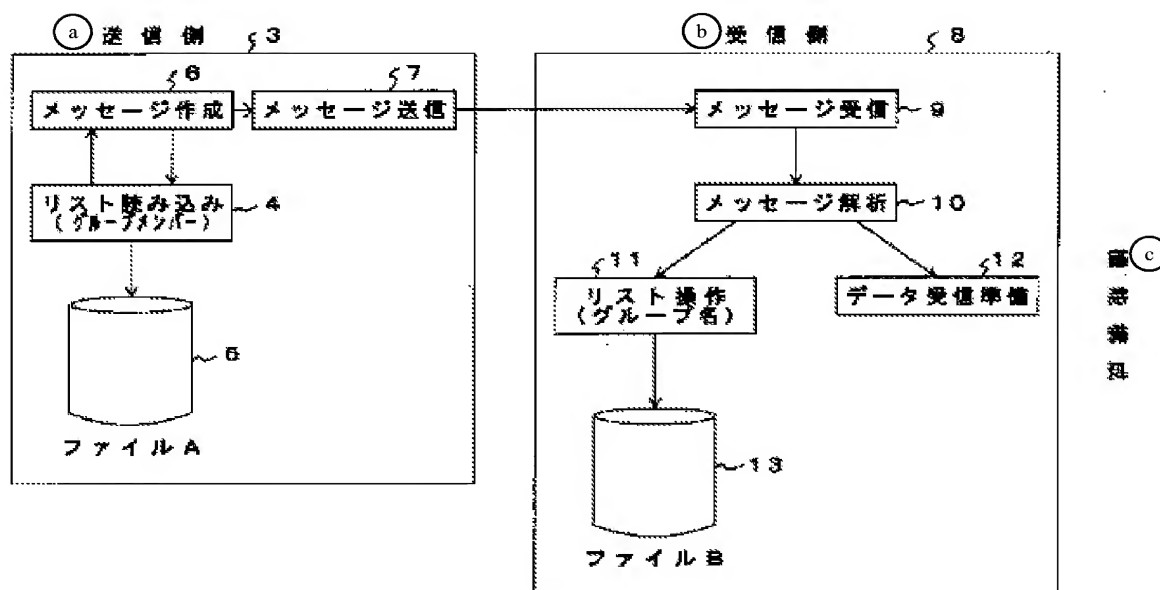   i   IP address
      j   Group name
      k   Null character

Figure 5

Key:
a	Transmitting side
b	Receiving side
c	Function configuration
4	Reading of list (group members)
5	File A
6	Create message
7	Transmit message
9	Receive message
10	Analyze message
11	List operation (group name)
12	Preparation for data reception
13	File B